



Georgia Department of Agriculture
Plant Protection Division
Tommy Irvin, Commissioner

AFRICANIZED HONEY BEE
ACTION PLAN
FOR GEORGIA

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INTRODUCTION

It is generally accepted that honey bees are the primary pollinating insects in North America. Honey bees are not native to North America but were imported from Europe nearly 400 years ago and spread rapidly throughout the New World after their introduction by settlers. Both managed commercial honey bee hives and feral bee colonies are valuable pollinators for crops and plants in natural forested areas.

Adequate pollination has a significant influence on crop yield and quality and, therefore, is an important component of U. S. agriculture. A 1991 report from the National Association of State Departments of Agriculture estimated the value of commercial crops directly pollinated by honey bees to be approximately \$5 billion with an additional \$14 billion in indirect benefits (hay, meat, milk, etc.). A 2004 publication by Roger A. Morse and Nicholas W. Calderone of Cornell University estimate the direct pollination value of honey bees may be as much as \$16 billion annually.

Georgia ranks 14th in the nation in honey production and second in queen bee and packaged bee production. Concerns by individuals, groups or government officials in Georgia and in neighboring states could have a detrimental impact on the queen and packaged bee industry. Therefore, it is essential that accurate and easily understood information be distributed to citizens of this state to educate the public on safety in regards to flying and stinging insects.

GOALS AND OBJECTIVES

The primary goals of the Georgia Africanized Honey Bee Advisory Committee are:

1. Develop a management plan that carefully outlines the strategies and plans based on the best current technology for dealing broadly with the Africanized honey bee when it arrives at our border.
2. Recommend priorities required to implement the regulatory, educational and research objectives of the Georgia Africanized Honey Bee Management Plan.
3. Ensure that each agency/organization represented receives the most current and accurate information on the Africanized honey bee as it is received.
4. Ensure a coordinated effort by the represented agencies/organizations in developing and carrying out a mutually acceptable plan for dealing with the Africanized honey bee when it enters Georgia.
5. Ensure that information released to the public is accurate and current to avoid unwarranted public concern.
6. Serve as an advisory group to the Commissioner of Agriculture on all facets of Africanized honey bees and keep each represented agency and organization advised of key developments.

BACKGROUND

The group of insects called “honey bees” is actually comprised of several subspecies. The European honey bee, *Apis mellifera*, has several subspecies that have been managed by commercial and hobby beekeepers worldwide for many centuries. Beekeepers have selectively bred honey bee colonies for desirable traits such as gentleness, honey production, tendency not to swarm, winter hardiness and disease resistance. Honey bees commonly kept in the U. S. are the Italian honey bee (*Apis mellifera ligustica*), the Carniolian honey bee (*A. mellifera carnica*), Caucasian honey bee (*A. mellifera caucasica*) and the Dark honey bee (*A. mellifera mellifera*).

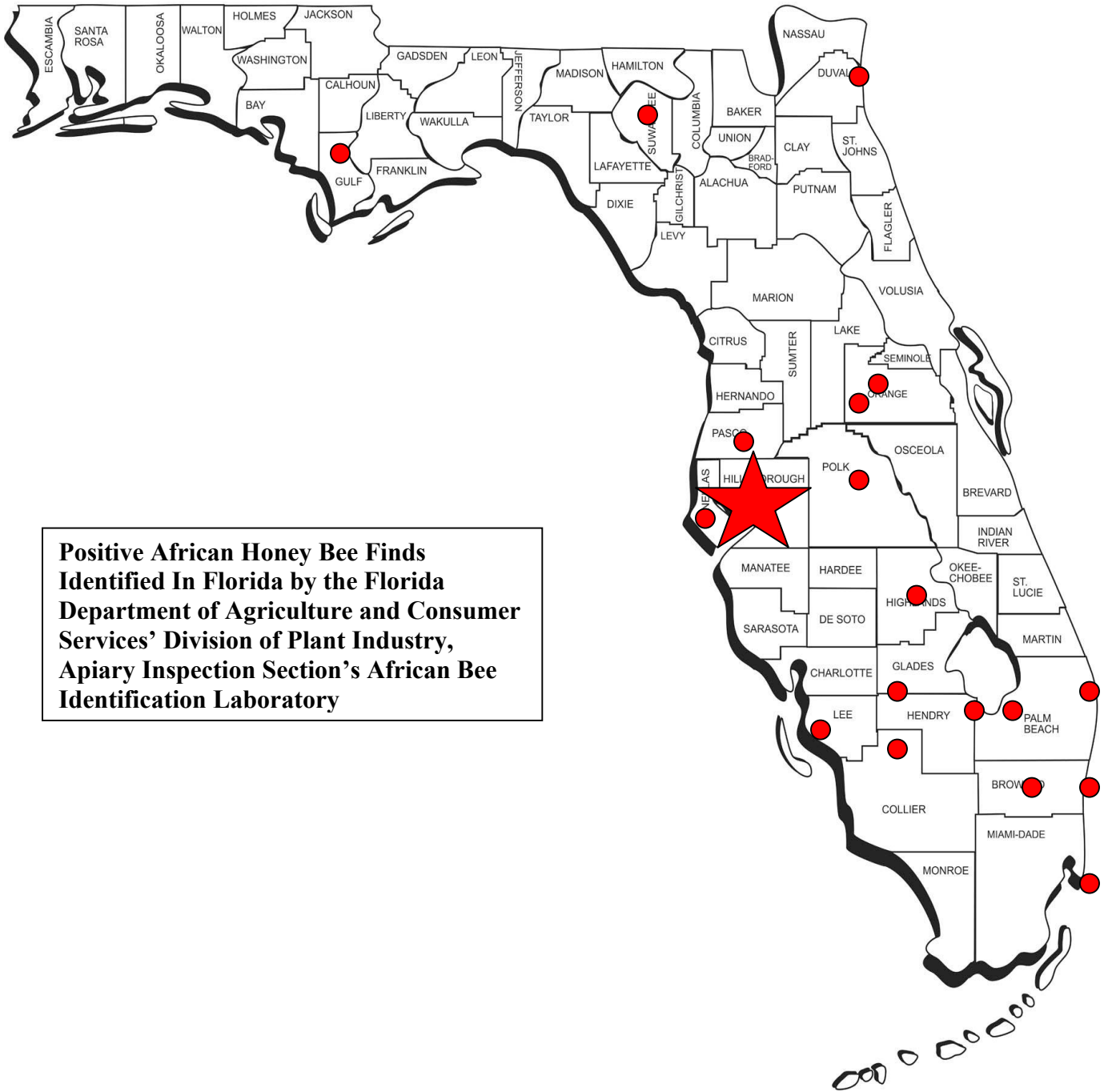
The African honey bee subspecies, (*A. mellifera scutellata*), on the other hand, has been adapted for survival over tens of thousands of years through natural selection in a rough, harsh environment in Africa where climate extremes and predation are prevalent. The result is a hardy subspecies (or race) of honey bee that is very defensive of its nest and prone to frequent swarming. The Africanized Honey Bee (or African-hybridized bee, AHB) is a result of mating between the African honey bee subspecies and European honey bee subspecies.

AFRICANIZED BEES IN THE AMERICAS

In 1956, a geneticist brought African honey bee queens to Brazil with the idea of developing a superior honey bee, one more suited to tropical conditions. Unfortunately, bees from 26 experimental colonies headed by African honey bee queens swarmed near Sao Paulo, Brazil. The bees interbred in the wild with the European honey bees, resulting in "Africanized" (or African-hybridized) offspring. The African-hybridized bees retain many traits from their African parents which include a very defensive behavior around their nests and frequent swarming. Through successive generations, these African-hybridized bees can approach nearly 100% African genetic traits.

The African-hybridized bee was first reported in northern Mexico in 1987. As it made its way north through Mexico, 175 fatalities and thousands of non-fatal stinging incidents were directly attributed to the AHB. The first report of the AHB in the United States was in October 1990 in Hidalgo, Texas. The AHB was documented in May of 1991 in Brownsville, Texas. The AHB has migrated west and is established in the states of Arizona, California, Nevada, New Mexico, Texas and Utah.

Africanized bee swarms may also be found on containerized shipments from South America. Swarms have been found in Mobile, Alabama and in Tampa, Florida. In 2005, Florida announced that Africanized or African-hybridized bees were established in the state and had been trapped as far north as Duvall County, FL, and Suwanee County, FL. With no natural barriers between the states of Florida and Georgia, it is likely that these bees will eventually migrate north and into Georgia (see map of Florida below). It is currently not known how much of the state Africanized bees will occupy.



Positive African Honey Bee Finds Identified In Florida by the Florida Department of Agriculture and Consumer Services' Division of Plant Industry, Apiary Inspection Section's African Bee Identification Laboratory

The stinging process is the same for the African-hybridized honey bee and the “normal” or European honey bees. Worker honey bees, whether African-hybridized or from regular European stock, only sting once. The edges of the stinger are jagged, so when a worker honey bee penetrates the skin with its stinger, the jagged edges get caught and prevent the stinger from being pulled back out. The worker honey bee tries and tries to free herself anyway and eventually she pulls her body away from the stinger. The stinger remains in the body attached to a muscle and venom sac that continues to pump venom until it is empty or the stinger removed. The venom from an African-hybridized honey bee is chemically the same as the venom from an European honey bee.

Although hundreds of non-fatal stinging incidents have been reported, the total United States (U.S.) fatalities due to stinging incidents since AHB arrived is 14, the latest being July 28, 2004 in Big Springs, Texas. All the feral (wild) honey bee colonies in these states are over 90% of Africanized bee descent, making it difficult for beekeepers to manage the gentler European honey bees that are used to keep out AHB genes.

CHARACTERISTICS OF AHB

As described earlier, AHB is a hybrid which resulted from the cross-mating of the African honey bee subspecies and several European honey bee subspecies. It is impossible to distinguish these subspecies (or the African-hybridized honey bee) through visual examination with the naked eye. To accurately identify African-hybridized honey bees, the bees must be analyzed in a laboratory through a process of dissection and measuring various body parts that are then compared against a large database of measurements. AHB can best be described by its defensiveness of its nest which translates to its aggressiveness and other behavioral differences, although there are small morphological as well as chemical differences that can be utilized to confirm Africanization. The behavioral principal characteristic of AHB which distinguishes it from the European or domestic honey bee is its aggressive defense of its nest. Once the combination of hybrids reaches a certain threshold level, bees with African genetics will likely start to mate with each other resulting in more pure African offspring.

Table 1. Characteristics of the Africanized Honey Bee (Under Tropical and Sub-Tropical Conditions in Florida) As Compared With Domestic European

Type Of Behavior	<u>AFRICAN HONEY BEE</u>	<u>EUROPEAN HONEY BEE</u>
Defensive Behavior	Strong defensive behavior Aggressive hive nest defense and stinging Typically 10 times as many stings per encounter AHB responds quicker, more bees respond, and higher percentage of responders sting	Gentle/ less aggressive Not aggressive

Swarming	Excessive swarming Typically 16 time as many swarms per year Longer swarming season, year round in Florida	Swarms once or twice per year
Absconding	Response to disturbance or dearth Absconding up to 16 times per year Excessive robbing of other honey bee colonies for resources	Highly unusual Beekeeper mismanagement can encourage these to take resources from other colonies
Nesting Sites	Lack of selectivity in choosing nesting sites Smaller cavities-trees, buildings, pipes, old tires, Concrete light fixtures, water valve and electrical boxes Because of excessive swarming and absconding there are many more feral or wild colonies in a given area	More selective of nesting sites with large volumes uses standard bee hives better Less wild colonies
Wintering	Poor winter survival in cold northern U. S. climates	Highly adapted to winter survival in cold climate
Takeover of other colonies	Queen parasitism Drone drift	Uncharacteristic
Mating	Mating advantage	No mating selectivity
Behavior	Unpredictable behavior Stinging Nervousness on combs Shorter development times of Queens and Workers Compared with EHB	Calmer Less easily made defensive Longer development time of queens and workers compared with AHB

AHB CHRONOLOGY IN NORTH AMERICA – DATES & EVENTS

1985 (northern 1987)	First reported in Mexico
1988 to 1995	Mexico reports 175 fatalities
October 1990 in Hidalgo (TX).....	First AHB discovery in U.S.
May 1991 in Brownsville (TX).....	First U. S. casualty (stinging incident)
May 91 to September 93	Texas reports 12 confirmed AHB stinging incidents
July 1993 in Harlingen (TX).....	First U. S. fatality
June 1993 (Tucson, AZ)	First AHB discovery in Arizona
1993 (Tucson, AZ).....	Arizona reports 53 stinging incidents in 1993,
October 1995 in Apache Junction.....	First Arizona fatality
1993.....	First AHB discovery in New Mexico
October 1994 in Blythe	First AHB discovery in California
(Chuckawalla State Prison)	
November 1995 in Palo Verde (CA)	First California casualty (stinging incident)
May 1998 in Laughlin.....	First AHB discovered in Nevada
September 1999 in Long Beach.....	First California fatality
July 28, 2004, Big Spring (TX)	Latest U. S. fatality from AHB stinging
1990-2004	14 U. S. fatalities due to AHB stinging incidents
June 23, 2005	Florida announces AHB established

Experience in other states demonstrate that advance preparation and planned public awareness programs results in better understanding and cooperation, and an appropriate response rather than panic, and relieves the possibility of injury or death. AHB invaded Venezuela in 1975. Human deaths due to stinging attacks reached a high of 100 per year in 1978 in this country of ten million people. A public awareness program including cartoon posters helped reduce human deaths to 20 per year. Mexico prepared, in advance, an even more effective public awareness program, including cartoon spots on TV, and had only five deaths during the first three years following the arrival of AHB.

ANTICIPATED IMPACT

Feral (or wild) European honey bee populations have decreased significantly with the introduction of exotic invasive pests such as tracheal mites (*Acarapis woodi*, 1984), varroa mite (*Varroa destructor*, 1987) and the small hive beetle (*Aethina tumida*, 1998). AHB could potentially fill this void and become the dominant feral honey bee. The following is a list of potential problems and concerns that could occur once the Africanized honey bee is present in Georgia.

1. Over dramatization of the Africanized honey bees' aggressive behavior by the press may lead to public prejudice against the beekeeping industry.
2. Public fear of the Africanized honey bee in some municipalities could result in demands

for unrealistic bee regulation that are contrary to sound science and logic.

3. The swarming, absconding, and stinging behavior of the Africanized honey bee may cause hobby beekeepers to lose interest in beekeeping.
4. Quarantines enacted by other states could severely damage Georgia's queen and package industry.
5. In crop pollination locations, the aggressive nature of Africanized honey bees may hinder the operation of farm machinery and prevent workers from entering fields.
6. Due to the reproductive biology (swarming and absconding) and nesting behavior of the Africanized honey bee, the public may be more likely to encounter Africanized honey bee swarms and colonies in cities, parks, forests, and neighborhoods.
7. The tendency of the Africanized honey bee to abscond when their hives are transported for pollination will increase the cost and difficulty of crop pollination.
8. The Africanized honey bee could interfere with timber harvest, fire control, and recreation in National or State Forests.
9. Concern over accidents/injuries associated with keeping Africanized honey bees may cause commercial beekeepers to go out of business.
10. The cost of transporting European honey bee for pollination services could increase.
11. Maintenance of European honey bee hives could increase due to the necessity of requeening hives yearly.
12. The costs to inform the medical and public health community of possible precautions and potential problems with Africanized honey bee sting encounters may rise.
13. The beekeeping industry is already suffering from the economic impact of mite pests, and the difficulties with Africanized bees may compound these problems in the short term. There is, however, evidence that Africanized bees are resistant to the mites and diseases affecting Georgia beekeepers, and the presence of Africanized bees in Georgia may reduce mite and disease problems in the long term.
14. An increase in the number of stinging (possibly lethal) incidents of confined livestock and domestic pets.

CURRENT ACTIVITIES

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ) has been trapping the ports of Savannah and Brunswick for AHB and has had no positive detections in over twelve years. The Georgia Department of Agriculture, Plant Protection Division is trapping the Georgia-Florida border as an early detection program to detect any natural migration of African-hybridized bees from Florida.

Georgia Department of Agriculture, Plant Protection Division Inspectors will continue to respond to claims of AHB within the state until these insects are established in the environment. With the exception of a swarm trapped by the USDA-APHIS-PPQ near the Port of Savannah in the late 1980s, there have not been any AHB detected in Georgia. Inspectors have responded to numerous complaints, collected and submitted samples for identification.

On August 26, 2005, the Georgia Agriculture Commissioner established the Georgia Africanized Honey Bee Advisory Committee. This Committee will periodically review and make revisions to the Africanized Honey Bee Action Plan for Georgia, advise the Commissioner on all aspects of AHB, and serve as technical advisors for publications and public outreach.

RECOMMENDATIONS

EDUCATION AND PUBLIC INFORMATION

The threat posed by Africanized or African-hybridized honey bee (AHB) has been sensationalized by cinema movies and media reports. These insects are very defense of their nest and will sting in mass in response to any stimulus they deem a threat, thus the label “killer bee” is common in movies and media reports. Intelligent planning and preparation by Western states has proven to be useful in alleviating public panic and hysteria associated with AHB. Florida has had several positive AHB finds in their ports in recent years. Apparently some of the Africanized drones have escaped from the port areas and mated with the local European bees resulting in African- hybridized colonies.

The discovery of Africanized honey bees in Georgia will likely be a major news story, generating possibly hundreds of press inquiries. It is expected that there will be several days, perhaps a week or more, of intense media interest. To help prevent and mitigate the possible public over-reaction to the media reporting it is essential that accurate and easily understood information be developed and available for distribution. These include:

1. The development of an "Africanized Honey Bee Reference Manual" that will serve as the primary information source for County Extension Agents, Extension Specialists and other key educational personnel and groups and with other cooperating state agencies and associations. This loose-leaf, 3-ring binder reference will serve as a primary source used to inform the public. Having available accurate, objective and interpretive information is the key to an effective educational program.
2. To complement the "Reference Manual", several fact sheets are proposed that target

specific public clientele and provide answers to the primary questions/concerns anticipated. The targeted clientele include:

- A. Beekeepers (both hobby and commercial).
 - B. Landowners and agricultural producers who have an economic interest (i.e. pollination service, provide apiary sites on their property, or may have concerns about the Africanized honey bee).
 - C. Livestock operators, especially confined operations.
 - D. Municipal "action groups" organized to deal with the influx of Africanized honey bee in urban environments (police, fire fighters, physicians, emergency medical technicians, pest control operators, private consultants, et al.)
 - E. State parks and other recreational areas
 - F. The general public.
3. Materials for television and radio news outlets also must be prepared for use in advance of the bees' arrival.
 4. Conduct workshops, symposia, seminars and meetings with organized groups (schools, first responders, etc.) to create greater awareness and knowledge.
 5. Develop audio-tutorials, video tapes, slide sets, graphic visuals, etc., for use by organized groups and by the print, television and radio media.

IMPORTANCE OF PUBLIC EDUCATION

One of the major goals in preparation for AHB arrival is to reduce public risk through education. The general public will need information concerning:

1. Presence or impending presence of AHB.
2. Value of beekeepers to society and of bees to crop pollination.
3. Certain honey bee biology facts (such as what they look like, as distinguished from yellow jackets, wasps, hornets, etc.).
4. Need to use caution when dealing with swarms or nesting colonies.
5. Desirability of contacting persons trained and certified for bee removal or control to deal with bee problems.
6. What to do if a stinging incident occurs.

7. How to “bee aware” and avoid getting into a dangerous situation.

BEEKEEPER EDUCATION

Beekeepers can be divided into one of two groups, hobbyists and commercial. Since commercial beekeepers derive their income from beekeeping activities, their colonies are more likely to be monitored and requeened or depopulated if the bees begin exhibiting AHB characteristics (i.e. unusual defensiveness, excessive vacating the hive when colonies worked, etc.).

Hobbyist, however, may not be as inclined to utilize management recommendations and are more likely to collect swarms to increase hive numbers. Education materials will need to be targeted to both groups. Education efforts will include:

Bee Management Techniques:

1. Queen Management
 - A. Requeen annually for all colonies.
 - B. Requeen with marked and/or clipped queens (certified or known to be of European ancestry and mated to European drones), preferably at least once per year.
 - C. If an unmarked queen is found during annual inspections, it is recommended that she be destroyed and the colony re-queened immediately with a marked and/or clipped queen of known European ancestry.
 - D. Requeening aggressive colonies, depopulate hive.
2. Drone Management
 - A. Provide European colonies with drone foundation to increase local output of drones with desirable characteristics.
3. Feral Colony Management for Commercial Queen and/or Package Operations
 - A. Place swarm traps (bait hives) near established apiaries.
 - B. Destroy all swarms captured.
 - C. Destroy all feral colonies discovered in nature in the vicinity of the apiary operation.
4. Managing Colonies in Africanized/Africanizing Areas

- A. Place hives on single stands instead of several per pallet.
- B. Use white-faced veils.
- C. Use large-volume smokers.
- D. Never place colonies near penned animals or areas of high human traffic.
- E. Requeen (if possible) or depopulate colonies that become excessively defensive.

In addition, hobbyists should be educated and discouraged from using swarms to increase hive numbers or the need to re-queen swarms when restocking hives.

RECOMMENDATIONS

1. A uniform information package needs to be developed to inform and educate the public to lessen the impact of AHB.
2. The Africanized Honey Bee Advisory Committee will periodically review and make revisions to the Africanized Honey Bee Action Plan for Georgia, advise the Commissioner on all aspects of AHB, and serve as technical advisors for publications and public outreach.
3. Additional research must be conducted. Critical areas include:
 - a. The likelihood of survival of AHB in Georgia
 - b. Areas of the State that are likely to become infested
 - c. Potential effects Georgia's agriculture should be determined
4. Explore a certification program for Georgia's queen and package bee industry.
5. Once established it will be the responsibility of local municipalities to respond to AHB incidences. A plan to inform and educate other Government Agencies needs to be developed in the event that AHB becomes established in Georgia.
6. Efforts should be made to generate, train, and encourage a specialty industry dedicated to problem bee removal. This can be viewed as subset of the pest control industry, but it requires a specialized set of skills in bee handling, home design, carpentry, and even plumbing and electricity. In practice few pest control companies deal with problem honey bees, deferring instead to local beekeepers who have varying degrees of willingness and expertise to deal with these unpredictable situations. With the arrival of AHBs there will be increasingly greater demand for this service, but as it stands bee removal is an "orphaned" (and unregulated) industry, lacking a tight fit with either beekeepers or pest control operators.

COORDINATED AHB ACTION PLAN ACTIVITY SUMMARY

PHASE I - Preparation

<u>ACTIVITY</u>	<u>AGENCIES</u>
Form Georgia Africanized Honey Bee Advisory Committee to make recommendations on AHB issues.	GDA
Establish protocol for reporting and investigating multiple bee stinging incidents	GDA/UGA
Test bee colonies found to be aggressive during routine apiary inspections.	GDA/UGA
Operate AHB traps around ports and at strategic points on Georgia-Florida borders.	GDA /USDA
Establish AHB information network among state agencies.	GDA /UGA
Develop mailing lists for targeted groups.	GDA /UGA
Develop information brochures for the general public and targeted groups.	GDA /UGA
Keep all agencies apprised of AHB migration.	GDA /UGA
Disseminate research findings	UGA
Address statutory changes relative to AHB threat.	GDA
Explore honey bee certification program	GDA/UGA

PHASE II – AHB Detection

<u>ACTIVITIES</u>	<u>AGENCIES</u>
Advise appropriate agencies of AHB detection	GDA
Individual agencies will produce and distribute Previously prepared news releases and public Announcements.	GDA
Distribute brochures, posters and educational aids previously developed.	GDA/UGA
Train appropriate staff on AHB worker safety measures and procedures in assisting bee sting victims.	GDA/UGA
Alert veterinary personnel and animal owners to minimize exposure of livestock and pets to AHB.	GDA/UGA
Implement honey bee certification program.	GDA/UGA
Intensify research to maintain genetically-closed bee breeding program to minimize cross mating.	UGA

PHASE III – AHB Establishment

ACTIVITIES

AGENCIES

Inform appropriate agencies that AHB is established in a specific operational area.	GDA
Local governments take a more active leadership role. Provide technical assistance support to local government.	GDA
Distribute appropriate brochures and educational aids.	GDA/UGA
Help prepare press releases and public service announcements for local use.	GDA
Recommend statutory changes made necessary by AHB establishment.	GDA
Implement bee management practices to increase public safety and safeguard managed bee colonies and domestic animals for AHB.	UGA
Incorporate procedure to identify European stock during routine apiary inspections.	GDA
If industry demands warrant, certify apiaries to meet quarantine requirements.	GDA
Train staff on precautionary information for persons visiting AHB areas.	GDA